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ANTHROPOMETRY OF SHOSHONEAN TRIBES

By FRANZ BOAS

The statistics on which the following description is based were collected during the years 1891 and 1892 in preparation for the exhibit of the department of anthropology of the World's Columbian Exposition, of which Prof. F. W. Putnam was the director. The anthropometric work of the department was in charge of the writer. The observations were made by Messrs T. L. Bolton and Walter R. Shaw. The tribes included in these statistics are the Shoshoni, the Bannock, and the Uintah, White River, Uncompagre, Moache, Capote, and Weeminuche Ute. The total series embraces 294 individuals, including 33 half bloods.

A comparison between the total results and those obtained by the two observers is first given as a test of the comparability of the material:

MEASUREMENTS OF MEN, 20–59 YEARS OF AGE

	TOTAL.			BOLTON.		SHAW.	
	mm.	*Standard Deviation.*	*Number of Observations.*	*mm.*	*Number of Observations.*	*mm.*	*Number of Observations.*
Stature	1661	± 59.2	109	1668	64	1650	45
Finger-reach	1732	± 62.5	107	1729	63	1736	44
Height of shoulder	1378	± 54.4	109	1382	64	1372	45
Height of point of finger	637	± 38.8	109	645	64	633	45
Height sitting	867	± 32.6	105	867	61	867	44
Width of shoulders	386	± 17.9	107	386	62	386	45
Length of head [1]	192.3	± 6.1	124	192.2	73	192.6	52
Breadth of head [1]	152.8	± 4.7	124	153.4	73	152.3	52
Breadth of face [1]	147.5	± 5.8	124	148.5	73	145.9	52
Height of face	118.7	± 5.3	108	118.3	63	119.1	45
Height of nose	52.2	± 3.0	108	52.4	63	51.8	45
Breadth of nose	43.4	± 2.8	108	43.5	63	43.3	45
Height of ear	65.2	± 3.1	45			65.2	45
Height of lips	15.4	± 3.7	43			15.4	43

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[1] Men twenty years and more.

MEASUREMENTS OF WOMEN, 17–59 YEARS OF AGE

	TOTAL.			BOLTON.		SHAW.	
	mm.	*Standard Deviation.*	*Number of Observations.*	*mm.*	*Number of Observations.*	*mm.*	*Number of Observations.*
Stature	1528	± 38.1	21	1536	10	1521	11
Finger-reach	1579	± 31.9	20	1566	9	1584	11
Height of shoulder	1260	± 30.8	21	1265	10	1256	11
Height of point of finger	585	± 29.7	21	590	10	581	11
Height sitting	807	± 23.9	20	800	9	814	11
Width of shoulders	346	± 16.2	20	346	9	345	11
Length of head [1]	184.3	±	26	184.5	11	184.1	15
Breadth of head [1]	146.2	±	26	146.5	11	146.0	15
Breadth of face [1]	136.9	±	26	138.0	11	136.1	15
Height of face	108.5	±	21	109.9	10	107.2	11
Height of nose [1]	47.1	±	26	48.2	11	46.3	15
Breadth of nose [1]	40.1	±	26	40.3	11	39.9	15
Height of ear	61.5	± 3.9	11			61.5	11
Height of lips	12.1	± 3.3	10			12.1	10

The agreement between these two series is so close that we may conclude that the methods of both observers were practically identical. The only measurement that shows considerable divergence is that of breadth of face, in which Shaw's measurements are much smaller than those of Bolton. This may be due to the occurrence of narrower faces among the Ute of Colorado which are contained in Shaw's series. Shaw has for 27 adult male Shoshoni an average breadth of face of 147.8 mm., while for 24 Ute of Colorado he has only 143.8 mm. This view is somewhat corroborated by the observations on children. On a former occasion[2] I have given the rates of growth of the breadth of face among Indian children. By adding these values to those observed among Indian children we obtain an approximate idea of the width of face of the adult. Bolton's observations on 14 boys from Utah give a value of 148.0 mm.; Shaw's measurements of 30 Shoshoni boys give an average of 149.5, and of 13 boys from Colorado an average of only 144.5.

I have also measurements of seven children, measured by both observers, Bolton's measurements antedating those of Shaw by one year. The values observed by Shaw show the following differences from those observed by Bolton:

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[1] Women seventeen years and more.

[2] *Verhandlungen der Berliner Anthropologischen Gesellschaft*, 1895, p. 408.

1. Length of head....+ 2.3
2. Breadth of head...+ 1.4
3. Breadth of face....+ 4.1
4. Height of face.... — 0.6
5. Height of nose.... — 0.1
6. Breadth of nose...+ 1.3

These values suggest a difference in method only in the fourth and fifth measurements which, instead of showing an increase due to growth, show a decrease. It would seem, therefore, that, among children, Shaw made these two measurements smaller than Bolton. Since Bolton had an extended practice under my personal supervision, particularly in measuring children, in Worcester, Mass., I regard his measurements as perfectly trustworthy. The averages of adult males do not show the same differences. This may be due to the fact that the location of the naso-frontal suture is much more easily ascertained in this case than in children and women.

On the whole it seems justifiable to treat both observers as following the same methods. If this is admitted we may suppose that the difference in breadth of face between the Shoshonean tribes of Utah and of Colorado does really exist. In all other respects the various tribes represent a uniform type, as shown by the following table of averages:

	Stature.	*Length of Head.*	*Breadth of Head.*	*Breadth of Face.*	*Height of Face.*	*Height of Nose.*	*Breadth of Nose.*
Shoshoni.....	1665 (42)	193.5 (43)	153.1 (43)	148.2 (43)	118.8 (42)	52.7 (42)	43.0 (42)
Bannock.....	1685 (6)	191.5 (7)	150.7 (7)	147.0 (7)	122.5 (6)	52.7 (6)	43.0 (6)
Uintah......	1641 (34)	192.4 (41)	152.8 (41)	148.0 (41)	118.7 (33)	52.1 (33)	43.2 (33)
White River..	1652 (5)	189.7 (6)	155.0 (6)	150.3 (6)	118.8 (5)	51.2 (5)	43.0 (5)
Uncompagre.	1628 (4)	189.3 (4)	153.5 (4)	146.9 (4)	115.3 (4)	51.5 (4)	44.5 (4)
Moache......	1650 (14)	190.6 (16)	152.1 (16)	143.4 (16)	118.2 (14)	52.6 (14)	42.4 (14)
Capote.......	1705 (2)	194.8 (5)	153.6 (5)	145.0 (5)	118.5 (2)	48.5 (2)	44.5 (2)
Weeminuche..	1647 (3)	190.3 (3)	149.0 (3)	143.7 (3)	116.3 (3)	48.7 (3)	42.0 (3)

The whole series is distributed as follows:

MEASUREMENTS OF MEN

cm.	*Stature.*	*Finger-reach.*	*cm.*	*Height of Shoulder.*	*cm.*	*Height of Point of Finger.*	*cm.*	*Height Sitting.*	*cm.*	*Width of Shoulders.*	*mm.*	*Length of Head.*	*mm.*	*Breadth of Head.*	*Breadth of Face.*	*mm.*	*Height of Face.*	*mm.*	*Height of Nose.*	*Breadth of Nose.*	*Height of Ear.*	*mm.*	*Height of Lips.*
153	1	—																					
154	—	—														104	1						
155	1	—									175	1	135	—	2	105	—	35		1			
156	2	—									176	—	136	—	2	106	1	36		—			
157	4	—	127	1							177	—	137	—	3	107	1	37		1			
158	2	—	128	2							178	—	138	—	2	108	1	38		1			
159	4	—	129	2							179	—	139	—	2	109	2	39		4			
160	4	1	130	2							180	—	140	—	3	110	2	40		7			
161	7	2	131	6	56	1					181	2	141	1	5	111	1	41		14			
162	4	—	132	4	57	5					182	2	142	—	7	112	6	42		18			
163	7	2	133	6	58	2					183	3	143	—	5	113	4	43		10			
164	8	4	134	12	59	2					184	4	144	2	6	114	3	44		15		9	3
165	7	4	135	6	60	10					185	6	145	4	7	115	5	45	—	15		10	—
166	11	2	136	3	61	10					186	5	146	3	7	116	5	46	2	8		11	3
167	6	4	137	6	62	13					187	7	147	7	12	117	10	47	6	6		12	5
168	8	5	138	8	63	10					188	4	148	9	12	118	10	48	5	4		13	7
169	4	9	139	14	64	16	79	1	34	2	189	11	149	6	6	119	3	49	6	1		14	3
170	5	5	140	9	65	14	80	3	35	3	190	3	150	9	6	120	12	50	16	2		15	2
171	6	7	141	3	66	5	81	2	36	5	191	6	151	11	7	121	10	51	10	1		16	2
172	4	7	142	7	67	5	82	2	37	15	192	12	152	7	5	122	7	52	10			17	4
173	2	5	143	3	68	7	83	4	38	25	193	9	153	8	7	123	8	53	17			18	5
174	5	7	144	3	69	2	84	12	39	24	194	7	154	8	5	124	2	54	12			19	3
175	3	6	145	4	70	1	85	9	40	20	195	4	155	9	2	125	5	55	12			20	4
176	—	3	146	1	71	3	86	25	41	9	196	9	156	8	5	126	2	56	6			21	1
177	1	5	147	5	72	—	87	13	42	4	197	4	157	15	1	127	1	57	1			22	1
178	—	11	148	—	73	1	88	8			198	6	158	7	2	128	3	58	3		1	23	1
179	1	2	149	—	74	—	89	7			199	4	159	5	1	129	1	59	—		—	24	—
180	—	4	150	—	75	—	90	6			200	5	160	2	1	130	2	60	1		3		
181	—	3	151	—	76	1	91	4			201	1	161	1	—			61	1		3		
182	—	2	152	—	77	—	92	4			202	1	162	—	—			62			2		
183	—	—	153	—	78	—	93	—			203	2	163	1	—			63			3		
184	—	2	154	—	79	—	94	2			204	2	164	—	—			64			4		
185	1	1	155	—	80	1	95	2			205	—	165	—				65			5		
186	—	—	156	1			96	1			206	2	166	—				66			7		
187	1	1	157	—							207	2	167	—				67			8		
188	—	1	158	1									168	—				68			5		
189	—	2	159	—									169	—				69			—		
													170	—				70			2		
													171	1				71			1		
																		72			1		
Average:	166.1	173.2		137.8		63.7		86.7		38.6		192.3		152.8	147.5		118.7		52.2	43.4	65.2		15.4
Cases:	109	107		109		109		105		107		124		124	124		108		108	108	45		43

MEASUREMENTS OF WOMEN

cm.	*Stature.*	*Finger-reach.*	*cm.*	*Height of Shoulder.*	*cm.*	*Height of Point of Finger.*	*cm.*	*Height Sitting.*	*cm.*	*Width of Shoulders.*	*mm.*	*Length of Head.*	*mm.*	*Breadth of Head.*	*Breadth of Face.*	*mm.*	*Height of Face.*	*mm.*	*Height of Nose.*	*Breadth of Nose.*	*Height of Ear.*	*mm.*	*Height of Lips.*
147	2												127		1								
148	1				53	—			33	6			128		—								
149	—				54	1			34	4			129		1								
150	4		120	—	55	3	75	1	35	6	170	1	130		3	100	—	35	—	1		5	1
151	—	1	121	1	56	2	76	1	36	2	171	—	131		—	101	2	36	—	3		6	—
152	5	—	122	2	57	1	77	—	37	—	172	—	132		1	102	1	37	—	2		7	—
153	1	—	123	2	58	4	78	—	38	1	173	1	133		—	103	—	38	1	1		8	—
154	1	3	124	2	59	3	79	5	39	1	174	—	134		2	104	—	39	—	2		9	—
155	2	1	125	1	60	3	80	1			175	1	135		1	105	1	40	—	5		10	1
156	1	2	126	5	61	2	81	4			176	1	136		3	106	1	41	1	2		11	3
157	3	1	127	2	62	—	82	3			177	1	137	1	—	107	3	42	1	2		12	1
158	—	3	128	2	63	1	83	1			178	—	138	1	4	108	2	43	—	2		13	1
159	—	3	129	1	64	—	84	4			179	1	139	—	1	109	3	44	—	—		14	—
160	—	1	130	2	65	—					180	2	140	2	1	110	3	45	4	1		15	1
161	—	1	131	—	66	—					181	3	141	1	2	111	3	46	4			16	1
162	—	3	132	—	67	1					182	1	142	2	2	112	—	47	2			17	1
163	1	1	133	—							183	2	143	2	2	113	—	48	4				
164	—		134	1							184	—	144	1	2	114	1	49	1				
165	—										185	—	145	1		115	—	50	—				
											186	—	146	2		116	—	51	1				
											187	1	147	1		117	—	52	—		1		
											188	—	148	3		118	—	53	—		—		
											189	4	149	1		119	—	54	1		—		
											190	4	150	4		120	—	55	1		—		
											191	1	151	2		121	—	56			—		
											192	—	152	—		122	1	57			1		
											193	—	153	—				58			—		
											194	—	154	—				59			—		
											195	—	155	1				60			1		
											196	1	156	1				61			1		
											197	—						62			3		
											198	—						63			1		
											199	1						64			—		
											200							65			1		
											201							66			2		
Average:	152.8	157.9		126.0		58.5		80.7		34.6		184.3		146.2	136.9		108.5		47.1	40.1	61.5		12.1
Cases:	21	20		21		21		20		20		26		26	26		21		21	21	11		10

The tabulation of the series of cephalic index for the two observers, and for men, women, boys, and girls, gives the following results:

	Men.		*Women.*		*Boys.*			*Girls.*		*Adults.*	*Children.*	*Total.*
	Bolton.	Shaw.	Bolton.	Shaw.	Bolton.	Shaw.	Boas.	Bolton.	Shaw.			
72........	1	—	—	—	—	—	—	—	—	1		1
73........	—	—	—	—	—	2	—	—	—	—	2	2
74........	1	—	—	—	—	1	—	—	—	1	1	2
75........	3	1	2	—	1	2	—	—	—	6	3	9
76........	4	6	—	—	—	4	—	—	4	10	8	18
77........	5	10	1	4	—	1	—	—	2	20	3	23
78........	13	3	—	2	—	1	—	1	4	18	6	24
79........	8	8	1	3	1	9	—	—	7	20	17	37
80........	14	10	2	2	4	6	1	—	7	28	18	46
81........	7	7	4	1	1	4	—	—	9	19	14	33
82........	2	2	—	—	2	3	—	—	1	4	6	10
83........	6	3	—	3	1	7	—	—	5	12	13	25
84........	5	1	—	—	2	—	—	—	3	6	5	11
85........	3	—	1	—	—	1	—	—	2	4	3	7
86........	—	1	—	—	1	—	—	—	1	1	2	3
87........	—	—	—	—	—	—	—	—	4	—	4	4
88........	—	—	—	—	—	—	—	—	1	—	1	1
89........	1	—	—	—	—	1	—	—	—	1	1	2
90........	—	—	—	—	—	—	—	—	—	—	—	—
91........	—	—	—	—	—	1	—	—	—	—	1	1
Average ..	79.7	79.2	79.5	79.4	81.2	79.9	80.0	78.0	81.1	79.5	80.6	79.96 ±3.04
Cases	73	52	11	15	13	43	1	1	50	151	108	259

It will be noticed that these series are quite uniform. Children are, as usual, a little more short-headed than adults. The variability for adults alone has the extremely low value of ± 2.7; that of children is ± 3.3. The coefficient of correlation for Bolton's series of men is +0.36, for Shaw's series of men +0.41, for the total series of men +0.38. In this also we have corroboration of the accuracy of the head measurements. The coefficient of correlation is remarkably high—much higher than among the Sioux Indians.

The average values presented on pages 751, 752, give us the following table of average indices:

	Men.	Women.
Index of finger-reach..........	104.3	103.3
Index of height of shoulder.....	83.0	82.4
Index of height of second finger.	38.4	38.3

	Men.	Women.
Index of length of arm	44.6	44.1
Index of height sitting	52.2	52.7
Index of width of shoulders	23.2	22.6
Cephalic index	79.5	79.5
Facial index	80.5	79.2
Nasal index	83.1	85.1

In order to test the value of certain descriptive features I instructed Mr Shaw to record the size of ear and thickness of lips as large, medium, small, and as thick, medium, thin. In the former case I made sure that there should be a considerable interval between the judgment and the measurement by placing them on opposite sides of the blank; thus an unbiased judgment was obtained. In the judgment of the lips the measurement was written in the space following the former. Mr Shaw did not record any middle-sized ears—only large and small. The distribution is as follows:

	Size of ear of men judged as :		*Size of ear of women judged as :*			*Lips of men judged as:*			*Lips of women judged as :*		
mm.	Large.	Small.	Large.	Small.	mm.	Thick.	Medium.	Thin.	Thick.	Medium.	Thin.
52				1							
:				:							
57				1							
58	—	1		—							
59	—	—		—							
60	—	3		1	5	—	—	—	—	—	1
61	—	3	1	1	6	—	—	—	—	—	—
62	—	2	2	1	7	—	—	—	—	—	1
63	—	3	1	—	8	—	—	2	—	—	1
64	—	4	—	—	9	—	—	3	—	—	—
65	3	2	—	2	10	—	—	2	—	—	1
66	2	5	3	—	11	—	2	2	—	2	2
67	7	2			12	—	6	—	—	2	—
68	3	2			13	—	7	—	—	1	—
69	1	—			14	—	3	—	—	—	—
70	1	2			15	—	2	—	—	1	—
71	2				16	—	2	—	—	1	—
72	1				17	1	3	—	1	—	—
73	1				18	3	2	—	—	—	—
74	1				19	3	—	—	—	—	—
75	—				20	4	—	—	—	—	—
76	—				21	1	—	—	—	—	—
77	—				22	1	—	—	—	—	—
78	—				23	1	—	—	—	—	—
79	1				24	—	—	—	—	—	—
	23	29	7	7		14	27	9	1	7	6

These series, particularly the first two, which exhibit a more unbiased judgment, show a very strong overlapping, which signifies a considerable ambiguity of the terms large and small. It will easily be seen that different observers would use the same terms with still less accuracy, so that we must conclude that descriptive features like those mentioned here are of value only in extreme cases.